

INFORMATION TECHNOLOGY CAREER CLUSTER DESIGN

Network Systems Pathway

CIP Code 11.0901

Approved Pathway:

- 1) Includes minimum of three secondary-level credits.
- 2) Includes a work-based element.
- 3) Consists of a sequence: Introductory-level, Technical-level, and Application-level courses.
- 4) Supporting documentation includes Articulation Agreement(s), Certification, Program Improvement Plan, and a Program of Study.
- 5) Technical-level and Application-level courses receive .5 state-weighted funding in an approved CTE pathway.

INTRODUCTORY LEVEL

Computing Systems	10002/60002	1 credit
Computer Applications	10004/60004	1 credit

TECHNICAL LEVEL

Network Technology	10101	1 credit
Networking Systems	10102	1 credit
Networking Infrastructure & Routing	10105	1 credit
Telecommunications in Networking	10106	1 credit
Wireless Networking	10107	1 credit
Network Security	10108	1 credit
IT Essentials: PC Hardware & Software	10254	1 credit

APPLICATION LEVEL

Applied Concepts of Networking	31095	1 credit
Network Systems Project Management & Resource Scheduling	31099	1 credit

KANSAS STATE CAREER CLUSTER COMPETENCY PROFILE

INFORMATION TECHNOLOGY CLUSTER

NETWORK SYSTEMS PATHWAY (C.I.P. 11.0901)

STUDENT _____

Rating Scale:

- 3 - Proficient Achievement**
- 2 - Limited Achievement**
- 1 - Inadequate Achievement**
- 0 - No Exposure**

Graduation Date _____
I certify that the student has received training in the areas
indicated. Instructor Signature _____

Instructor Signature _____

COMMON CAREER TECHNICAL CORE – CAREER READY STANDARDS

1. Act as a responsible and contributing citizen and employee
2. Apply appropriate academic and technical skills
3. Attend to personal health and financial well-being
4. Communicate clearly, effectively and with reason
5. Consider the environmental, social and economic impacts of decisions
6. Demonstrate creativity and innovation
7. Employ valid and reliable research strategies
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management
10. Plan education and career path aligned to personal goals
11. Use technology to enhance productivity
12. Work productively in teams while using cultural/global competence

COMMON CAREER TECHNICAL CORE – INFORMATION TECHNOLOGY CLUSTER STANDARDS

1. Demonstrate effective professional communication skills and practices that enable positive customer relationships.
2. Use product or service design processes and guidelines to produce a quality, information technology product or service.
3. Demonstrate the use of cross- functional teams in achieving IT project goals.
4. Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
5. Explain the implications of IT on business development.
6. Describe trends in emerging and evolving computer technologies and their influence on IT practices.
7. Perform standard computer backup and restore procedures to protect IT information.
8. Recognize and analyze potential IT security threats to develop and maintain security requirements.
9. Describe quality assurance practices and methods employed in producing/providing quality IT products/services.
10. Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
11. Demonstrate knowledge of the hardware components associated with information systems.
12. Compare key functions and applications of software and determine maintenance strategies for computer systems.

INTRODUCTORY LEVEL COURSES

10002 Computing Systems

Computing Systems courses offer a broad exploration of the use of computers in a variety of fields. These courses have a considerable range of content, but typically include the introduction of robotics and control systems, computer-assisted design, computer-aided manufacturing systems, and other computer technologies as they relate to industry applications.

3 2 1 0 1. Overview of Systems

- a. Identify computer classifications and hardware.
 - i. Identify types of computer storage devices.
 - ii. Identify major hardware components and their functions.
 - iii. Identify the different types of computing devices.
- b. Identify new IT technologies and assess their potential importance and impact on the future.
- c. Identify new & emerging drivers and inhibitors of information technology change.
- d. Operate computer-driven equipment and machines.
- e. Apply knowledge of operating systems principles to ensure optimal functioning of system.
- f. Understand data communications trends and issues.
- g. Demonstrate knowledge of data transmission codes and protocols.
- h. Understand elements and types of information processing. (i.e., input, process, output).
(e.g., batch, interactive, event-driven, object-oriented).

3 2 1 0 2. Computer Operations

- a. Identify and understand the fundamentals of operating systems and their components.
- b. Configure systems to provide optimal system interfaces
- c. Clearly document step-by-step installation procedures for future use and configuration.
- d. Apply concepts of privileged instructions and protected mode programming.
- e. Configure peripheral device drivers (e.g., disk, display, printer, modem, keyboard, and mouse).
- f. Allocate disk space, non-sharable resources, and I/O devices.
- g. Interface peripheral devices/controllers in the computer system (e.g., software and hardware interrupts, exceptions, Direct Memory Addressing [DMA], bus structures).
- h. Identify standards and issues related to I/O programming and design of I/O interfaces.
- i. Define hardware-software interface issues for a computer system.
- j. Review automated scheduling software and Identify scheduling priority in programming.
- k. Document procedures and actions through development of audit trails.

3 2 1 0 3. Hardware

- a. Ensure that hardware and software system components are compatible and licensed prior to performing installation.
- b. Evaluate systems engineering considerations.
- c. Demonstrate knowledge of how bandwidths affect data transmission and on-screen image.
- d. Evaluate information systems problem-solving techniques and approaches.
- e. Determine the accuracy and completeness of the information gathered.
- f. Explain data communications procedures, equipment and media.
- g. Explain measurement techniques for increased productivity due to information systems implementation.
- h. Explain the differences between local and wide area networks.
- i. Explain the benefits of hosting a web site on a local server vs. at an ISP (Internet Service Provider).
- j. Troubleshoot computer-driven equipment and machines and access support as needed
(e.g. Test system using diagnostic tools/software, repair/replace malfunctioning hardware and reinstall software as needed, recover data and/or files and restore system to normal operating standards.)

3 2 1 0 4. Software

- a. Determine software design process, from specification to implementation and appraise software process and product life cycle models.
- b. Explain new and emerging classes of software.

- c. Explain the key functions and applications of software.
- d. Demonstrate knowledge of the function and operation of compilers and interpreters.
- e. Demonstrate knowledge of widely used software applications (e.g., word processing, database management, spreadsheet development, publishing software).
- f. Demonstrate an understanding of various programming paradigms (OO, functional, logic) in software development
- g. Demonstrate knowledge of how data is organized in software development: source version data, project progress data, etc. to increase individual efficiency and respect team member data.
- h. Explain the features and functions of how web browsing software affects the look of a web page, consider the characteristics and uses of plug-ins and examine role of browsers in reading files on the World Wide Web (text-only, hypertext).
- i. Explain the role of number systems in information systems and internal data representation.
- j. Identify the role the binary system in information systems.

3 2 1 0 **5. Serving the needs of the end user**

- a. Communicate to understand the problem the user wants to solve independent of the technology (empathy). Consider develop context awareness -- consider the context of the user and the problem before proposing a solution.
- b. Perform software customization as requested to meet the needs of the end user.
- c. Perform installation accurately and completely, using available resources as needed.
- d. Resolve problems with installation if they occur.
- e. Test and maintain products /services.
- f. Initiate predictive maintenance procedures.
- g. Consider customer satisfaction in determining product characteristics (e.g., usefulness, price, operation, life, reliability, safety, and cost of operation).
- h. Use available reference tools (e.g., procedural manuals, documentation, standards, and work flowcharts) as appropriate to access needed information.
- i. Use installation/operation manuals to access needed information using appropriate reference materials.
- j. Use reliability factors (e.g., cost, human, productivity) to plan for and create products/ services; with consideration of maintainability, good design, design simplification, and design redundancy.
- k. Demonstrate knowledge of critical thinking skills, decision-making skills and develop a plan using data-oriented techniques.

10004-Computer Applications

In Computer Applications courses, students acquire knowledge of and experience in the proper and efficient use of previously written software packages. These courses explore a wide range of applications, including (but not limited to) word-processing, spreadsheet, graphics, and database programs, and they may also cover the use of electronic mail and desktop publishing.

3 2 1 0 **1. Personal Information Management**

- a. Identify PIM applications (e.g., Essential PIM, MS Outlook, Lotus Notes...) and maintain safe and secure user profiles.
- b. Manage daily/weekly/monthly schedule using applications such as. (e.g., Notes, MS Outlook, calendars/schedules.)
- c. Create reminder for oneself and send notes/ informal memos using PIM applications.
- d. Access email system using login and password functions. Access email messages received
- e. Create and send e-mail messages in accordance with established business standards (e.g., grammar, word usage, spelling, sentence structure, clarity) demonstrating knowledge of email etiquette.
- f. Attach files to send with messages and access and save received attachments.
- g. Demonstrate knowledge of contamination protection strategies for email.
- h. Maintain shared database of contact information.
- i. Participate in virtual group discussions and meetings.

3 2 1 0 **2. Research and Internet**

- a. Test Internet connection.

- b. Navigate web sites using software functions. (e.g., Forward, Back, Go To, Bookmarks). Utilize online tools
- c. Explore the multimedia capabilities of the World Wide Web.
- d. Bookmark web addresses (URLs).
- e. Locate information using appropriate search procedures and approaches through a variety of search engines and Boolean logic.
- f. Access, evaluate accuracy, and compile Internet resource information for a variety of purposes. (e.g., library catalogs, business, technical, commercial, government, educational)
- g. Unpack files using compression software. Organize and archive files.

3 2 1 0 3. **Word Processing and Presentations**

- a. Create/Open Edit and Save documents (e.g., letters, memos, reports) and presentations using existing forms and templates.
- b. Employ word processing utility tools (e.g., spell checker, grammar checker). Locate/replace data using search and replace functions.
- c. Format text using basic formatting functions.
- d. Enhance publications using different fonts, styles, attributes, justification, etc.
- e. Enhance publications using paint/draw functions.
- f. Format new desktop publishing files and recognize the advantages and disadvantages of export options.
- g. Place graphics (e.g., graph, clip art, table) in a document or slide in accordance with basic principles of graphics design and visual communication.
- h. Prepare publications using desktop and cloud publishing applications.

3 2 1 0 4. **Spreadsheets**

- a. Create/Open Edit and Save spreadsheets.
- b. Create charts and graphs from spreadsheets.
- c. Group worksheets.
- d. Input/process data using spreadsheet functions.
- e. Perform calculations using simple formulas.
- f. Locate/replace data using search and replace functions.
- g. Process data using database functions (e.g., structure, format, attributes, relationships, keys).
- h. Perform single- and multiple-table queries (e.g., create, run, save).
- i. Verify accuracy of output.
- j. Maintain shared database of contact information.

3 2 1 0 6. **Ethics and Security**

- a. Demonstrate knowledge of potential internal and external threats to security. Maximize threat reduction.
- b. Assess exposure to security issues.
- c. Demonstrate knowledge of virus protection strategy and ability to load virus detection/protection software.
- d. Identify sources of virus infections and how to remove viruses.
- e. Report viruses in compliance with company standards.
- f. Ensure compliance with security rules, regulations, and codes.
- g. Explore ways to implement countermeasures.
- h. Implement security procedures in accordance with business ethics.
- i. Document security procedures.
- j. Understand how to follow a disaster plan.
- k. Understand how to utilize backup and recovery procedures.
- l. Maintain confidentiality.
- m. Understand how to provide for user authentication (e.g., assign passwords, access level).

3 2 1 0 7. **History / Quality Assurance**

Demonstrate knowledge of the diverse continuous improvement cycles within industry and their characteristics.

(e.g., Baldrige Performance Excellence, Demming, ISO 9000, Six Sigma)

3 2 1 0 8. **Personal Attributes for success. Career Technical Core Skills.**

- a. Act as a responsible and contributing citizen and employee

- b. Demonstrate effective professional communication skills and practices that enable positive customer relationships.
 - c. Apply appropriate academic and technical skills
 - d. Attend to personal health and financial well-being
 - e. Communicate clearly, effectively and with reason
 - f. Consider the environmental, social and economic impacts of decisions
 - g. Demonstrate the use of cross-functional teams in achieving IT project goals.
- Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.

TECHNICAL LEVEL COURSES

10101 Network Technology

Network Technology courses address the technology involved in the transmission of data between and among computers through data lines, telephone lines, or other transmission media (such as hard wiring, cable television networks, radio waves, and so on). These courses may emphasize the capabilities of networks, network technology itself, or both. Students typically learn about network capabilities—including electronic mail, public networks, and electronic bulletin boards—and network technology—including network software, hardware, and peripherals involved in setting up and maintaining a computer network.

- 3 2 1 0 1. Determine required service level.
- 3 2 1 0 2. Gather data to identify customer/stakeholder requirement.
- 3 2 1 0 3. Identify time, technology, and resource constraints.
- 3 2 1 0 5. Identify environment requirements, conditions and limitations.
- 3 2 1 0 6. Identify hardware, networking, and software system functional requirements.
- 3 2 1 0 7. Identify input and output requirements.
- 3 2 1 0 8. Identify physical requirements for system implementation.
- 3 2 1 0 9. Identify system requirements for various types of installations.
- 3 2 1 0 10. Analyze existing procedures
- 3 2 1 0 11. Determine necessary user applications (e.g. web access, email
- 3 2 1 0 12. Evaluate the potential effect of emerging technologies on information system software/hardware.
- 3 2 1 0 13. Gather information on system objectives from users
- 3 2 1 0 14. Identify power and power supplies
- 3 2 1 0 15. Identify Structural capacities and Electrical wiring codes
- 3 2 1 0 16. Perform workflow analysis to determine user needs
- 3 2 1 0 17. Define systems and software requirements.
- 3 2 1 0 18. Analyze facilities' bandwidth requirements.
- 3 2 1 0 19. Identify site and system constraints.
- 3 2 1 0 20. Identify security requirements and the need for data protection.
- 3 2 1 0 21. Demonstrate a basic knowledge of OSI modeling
- 3 2 1 0 22. Demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, and firewall).
- 3 2 1 0 23. Differentiate between a physical and logical topology.
- 3 2 1 0 24. Demonstrate knowledge of basic telephony (analog vs. digital signals).
- 3 2 1 0 25. Identify basic physical and logical topologies (e.g. star, ring, bus).
- 3 2 1 0 26. Identify emerging networks.
- 3 2 1 0 27. Identify how the four components of a network operating system (i.e., server platform, network services software,

- 3 2 1 0 28. Demonstrate knowledge of the reasons for installing a network.
- 3 2 1 0 29. Trace the evolution of networks.
- 3 2 1 0 30. Demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.
- 3 2 1 0 31. Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems
- 3 2 1 0 32. Demonstrate knowledge of the open system interconnection (OSI) standard (ISO Standard 7498).
- 3 2 1 0 34. Demonstrate knowledge security requirements and the need for data protection
- 3 2 1 0 35. Demonstrate knowledge about the difference between stand-alone, peer-to-peer and client-server networks and software.
- 3 2 1 0 36. Demonstrate knowledge of the general characteristics of network operating systems.
- 3 2 1 0 37. Evaluate installation requirements
- 3 2 1 0 38. Identify differences between stand-alone and network applications / operating systems.
- 3 2 1 0 39. Develop a disaster recovery plan.
- 3 2 1 0 40. Differentiate between disaster recovery and business continuance.
- 3 2 1 0 41. Identify common backup devices.
- 3 2 1 0 42. Identify methods for avoiding common computer system disasters
- 3 2 1 0 43. Identify the criteria for selecting a backup system.
- 3 2 1 0 44. Identify the steps in a disaster recovery plan and a business resumption plan.
- 3 2 1 0 45. Identify skill level needs of support personnel.
- 3 2 1 0 46. Identify support requirements.
- 3 2 1 0 47. Identify battery backup equipment.
- 3 2 1 0 48. Identify the different types of backups (differential, complete, incremental).
- 3 2 1 0 49. Recognize the need for regular backup procedures.
- 3 2 1 0 50. Demonstrate knowledge of the basic elements of network maintenance.
- 3 2 1 0 51. Identify available diagnostic tools used for system maintenance.
- 3 2 1 0 52. Identify maintenance procedures and processes.
- 3 2 1 0 53. Demonstrate knowledge of basic troubleshooting steps.

10102 Networking Systems

Networking Systems covers networking architecture, structure, and functions. The course introduces the principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations to provide a foundation for the curriculum.

By the end of the course, students will be able to: Explain network technologies Explain how devices access local and remote network resources* Describe router hardware* Explain how switching operates in a small to medium-sized business network* Design an IP addressing scheme to provide network connectivity for a small to medium-sized business network* Configure initial settings on a network device* Implement basic network connectivity between devices* Configure monitoring tools available for small to medium-sized business networks.*

- 3 2 1 0 1. Clarify specifications using questioning techniques
- 3 2 1 0 2. Develop functional requirements/ specifications for high-level systems.
- 3 2 1 0 3. Gather data to identify customer/stakeholder requirement.
- 3 2 1 0 4. Gather information using interviewing strategies
- 3 2 1 0 5. Identify new application requirements within the system
- 3 2 1 0 6. Identify security requirements
- 3 2 1 0 7. Access needed information using company and manufacturers' references (e.g., procedural

manuals, documentation, standards, and work flowcharts).

- 3 2 1 0 8. Demonstrate knowledge of the use, structure, and contents of a requirements specification document
- 3 2 1 0 9. Develop formal specifications
- 3 2 1 0 10. Review and verify specifications with customer
- 3 2 1 0 11. Demonstrate knowledge of how to use software methodologies to analyze a real- world problem.
- 3 2 1 0 12. Analyze facilities' capacity planning (power cable/wire conduit).
- 3 2 1 0 13. Define power conversion
- 3 2 1 0 14. Develop security plan.
- 3 2 1 0 15. Identify specific access levels that need to be accommodated.
- 3 2 1 0 16. Match security system design to identified security requirements
- 3 2 1 0 17. Demonstrate a basic knowledge of OSI modeling.
- 3 2 1 0 18. Demonstrate knowledge of LAN transmission methods and standards
- 3 2 1 0 19. Demonstrate knowledge of LAN transmission protocols
- 3 2 1 0 20. Differentiate processes, services, & protocols.
- 3 2 1 0 21. Demonstrate knowledge of electronic communications (e.g., LAN, Internet, remote database access, EDI).
- 3 2 1 0 22. Select a LAN/WAN technology that meets defined set of requirements
- 3 2 1 0 23. Analyze current trends and development in LANs
- 3 2 1 0 24. Demonstrate knowledge of local-area network (LAN) trends and issues
- 3 2 1 0 25. Demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.
- 3 2 1 0 26. Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems
- 3 2 1 0 27. Configure a Virtual Private Network (VPN) to form the infrastructure of the WAN
- 3 2 1 0 28. Demonstrate knowledge of firewall implementation between trusted network and WAN.
- 3 2 1 0 29. Demonstrate knowledge of interconnecting LANs using WAN services
- 3 2 1 0 30. Demonstrate knowledge of the conversion of analog speech to digital.
- 3 2 1 0 31. Demonstrate knowledge of the role that routers, firewalls, intrusion detection systems, and VPNs play in security.
- 3 2 1 0 32. Ensure that all multi-user aspects of the application function are operational
- 3 2 1 0 33. Install appropriate operating system hardware and software and peripherals.
- 3 2 1 0 34. Install information system application programs in accordance with requirements.
- 3 2 1 0 35. Install structured cabling
- 3 2 1 0 36. Assemble necessary components to complement information system design.
- 3 2 1 0 37. Load software with minimum disruption of process flow.
- 3 2 1 0 38. Resolve compatibility issues.
- 3 2 1 0 39. Create a baseline of system/network performance.
- 3 2 1 0 40. Identify abnormal system performance.
- 3 2 1 0 41. Recognize environmental problems.
- 3 2 1 0 42. Backup system
- 3 2 1 0 43. Develop a disaster recovery plan.
- 3 2 1 0 44. Restore system.
- 3 2 1 0 45. Choose and implement an appropriate routing protocol.
- 3 2 1 0 45. Identify principles governing software acquisition and upgrades.
- 3 2 1 0 46. Define scope of work to meet customer needs.

- 3 2 1 0 47. Formulate a support plan.
- 3 2 1 0 48. Communicate and document technical support provided.
- 3 2 1 0 49. Respond to user questions.
- 3 2 1 0 50. Analyze operational problems.
- 3 2 1 0 51. Install and configure Internet software packages.
- 3 2 1 0 52. Upgrade network system software.
- 3 2 1 0 53. Develop backup process
- 3 2 1 0 54. Install surge suppression protection.
- 3 2 1 0 55. Evaluate maintenance processes and outcomes.
- 3 2 1 0 56. Fix recoverable problems
- 3 2 1 0 57. Identify problems using diagnostic tools.
- 3 2 1 0 58. Implement selected solution.
- 3 2 1 0 59. Minimize impact of problems on productivity (e.g. minimize downtime)
- 3 2 1 0 60. Run diagnostics
- 3 2 1 0 61. Select most appropriate solution
- 3 2 1 0 62. Develop resolution plan.
- 3 2 1 0 63. Document results and solutions
- 3 2 1 0 64. Identify problems using diagnostic tools.
- 3 2 1 0 65. Perform appropriate analysis to identify problem cause
- 3 2 1 0 66. Test identified solutions.
- 3 2 1 0 67. Isolate system faults in various types of networks, cables, data modems, and carrier systems

10105 Networking Infrastructure & Routing Essentials

*Networking Infrastructure & Routing Essentials covers the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of the course, students will be able to: * Determine how a router will forward traffic based on the contents of a routing table. * Explain how switching operates in a small to medium-sized business network. * Use monitoring tools and network management protocols to troubleshoot data networks. * Configure monitoring tools available for small to medium-sized business networks. * Configure initial settings on a network device. * Configure Ethernet switch ports. * Implement VLANs. * Implement static routing. * Implement DHCP on a router. * Implement network address translation (NAT). * Implement access control lists (ACLs) to filter traffic.*

- 3 2 1 0 1. Identify physical requirements for system implementation.
- 3 2 1 0 2. Identify system requirements for various types of installations.
- 3 2 1 0 3. Analyze existing procedures
- 3 2 1 0 4. Evaluate installation requirements
- 3 2 1 0 5. Resolve conflicting requirements.
- 3 2 1 0 6. Analyze facilities' bandwidth requirements.
- 3 2 1 0 7. Identify site and system constraints
- 3 2 1 0 8. Analyze facilities' capacity planning (power cable/wire conduit).
- 3 2 1 0 9. Demonstrate knowledge of various frame types and formats.
- 3 2 1 0 10. Describe common VoIP protocols, including Session Initiation Protocol (SIP), H.323, and Megaco/H.248. Demonstrate knowledge of the IPX/SPX protocol suite
- 3 2 1 0 11. Demonstrate knowledge of the open system interconnection (OSI) standard (ISO Standard 7498).
- 3 2 1 0 12. Demonstrate knowledge of the TCP/IP protocol suite.

- 3 2 1 0 13. Identify standard high-speed networks (e.g., broadband, ISDN, SMDS, ATM, FDDI).
- 3 2 1 0 14. Demonstrate knowledge of the role that routers, firewall, intrusion detection systems, and VPNs play in security.
- 3 2 1 0 15. Perform remote monitoring.
- 3 2 1 0 16. Recognize security problems.
- 3 2 1 0 17. Recognize system alerts.
- 3 2 1 0 18. Document network system malfunction(s).
- 3 2 1 0 19. Fix recoverable problems.
- 3 2 1 0 20. Respond to system messages.
- 3 2 1 0 21. Run diagnostics
- 3 2 1 0 22. Isolate system faults in various types of networks, cables, data modems, and carrier systems.
- 3 2 1 0 23. Identify Router Products
- 3 2 1 0 24. Install Router Products

10106 Telecommunications in Networking

Wireless Networks courses focus on the design, planning, implementation, operation, and trouble-shooting of wireless computer networks. These courses typically include a comprehensive overview of best practices in technology, security, and design, with particular emphasis on hands-on skills in

(1) wireless LAN set-up and trouble-shooting; (2) 802.11a & 802.11b technologies, products, and solutions; (3) site surveys; (4) resilient WLAN design, installation, and configuration; (5) vendor interoperability strategies; and (6) wireless bridging.

- 3 2 1 0 1. Identify time, technology, and resource
- 3 2 1 0 2. Identify physical requirements for system implementation.
- 3 2 1 0 3. Identify system requirements for various types of installations.
- 3 2 1 0 4. Determine necessary user applications (e.g. w access, email).
- 3 2 1 0 5. Evaluate installation requirements
- 3 2 1 0 6. Resolve conflicting requirements
- 3 2 1 0 7. Analyze facilities' bandwidth requirements
- 3 2 1 0 8. Demonstrate knowledge of how to use software methodologies to analyze a real-world problem.
- 3 2 1 0 9. Identify Structural capacities and Electrical wiring codes. operating systems (i.e., Windows XP, LINUX, UNIX, etc.).
- 3 2 1 0 10. Analyze facilities' capacity planning (power conduit).
- 3 2 1 0 11. Evaluate the potential effect of emerging on information system software/hardware.
- 3 2 1 0 12. Demonstrate knowledge of the characteristics of network components (e.g., hub, switches, routers, firewall).
- 3 2 1 0 13. Differentiate processes, services, and protocols
- 3 2 1 0 14. Differentiate between LANs, and WANs
- 3 2 1 0 15. Differentiate between point-to-point and point-multipoint network topologies
- 3 2 1 0 16. Demonstrate knowledge of packet-switching techniques
- 3 2 1 0 17. Identify basic physical and logical topologies (e.g. star, ring, bus).
- 3 2 1 0 18. Demonstrate knowledge of characteristics of connection-oriented and connectionless networks.
- 3 2 1 0 19. Identify emerging networks.
- 3 2 1 0 20. Select a LAN/WAN technology that meets defined set of requirements.
- 3 2 1 0 21. Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics,

etc.) and wireless systems.

- 3 2 1 0 22. Demonstrate knowledge of the principles and operation of fiber optics, analog and digital
- 3 2 1 0 23. Demonstrate knowledge of the TCP/IP protocol
- 3 2 1 0 24. Demonstrate knowledge of firewall implementation between trusted network and
- 3 2 1 0 25. Configure a Virtual Private Network (VPN) to form the infrastructure of the WAN.
- 3 2 1 0 26. Demonstrate knowledge of interconnecting LANs using WAN services.
- 3 2 1 0 27. Demonstrate knowledge of the role that routers, firewalls, intrusion detection systems, and VPNs play in security
- 3 2 1 0 28. Demonstrate knowledge of network codes
- 3 2 1 0 29. Install structured cabling.
- 3 2 1 0 30. Identify available diagnostic tools used for system maintenance.
- 3 2 1 0 31. Respond to system messages.
- 3 2 1 0 32. Document network system malfunctions.
- 3 2 1 0 33. Fix recoverable problems.
- 3 2 1 0 34. Create maintenance plans for regular integrity checks.
- 3 2 1 0 35. Demonstrate knowledge of basic troubleshooting checks.
- 3 2 1 0 36. Document results and solutions.
- 3 2 1 0 37. Isolate system faults in various types of networks, cables, data modems, and carrier systems.

10107 Wireless Networking

Wireless Networks courses focus on the design, planning, implementation, operation, and trouble-shooting of wireless computer networks. These courses typically include a comprehensive overview of best practices in technology, security, and design, with particular emphasis on hands-on skills in (1) wireless LAN set-up and trouble-shooting; (2) 802.11a & 802.11b technologies, products, and solutions; (3) site surveys; (4) resilient WLAN design, installation, and configuration; (5) vendor interoperability strategies; and (6) wireless bridging.

- 3 2 1 0 1. Identify hardware, networking, and software system functional requirements.
- 3 2 1 0 2. Identify physical requirements for system implementation
- 3 2 1 0 3. Identify time, technology, and resource constraints.
- 3 2 1 0 4. Determine necessary user applications (e.g. web access, email).
- 3 2 1 0 5. Define system and software requirements.
- 3 2 1 0 6. Evaluate installation requirements.
- 3 2 1 0 7. Resolve conflicting requirements.
- 3 2 1 0 8. Identify site and system constraints.
- 3 2 1 0 9. Analyze facilities' capacity planning (power cable/wire conduit).
- 3 2 1 0 10. Evaluate the potential effect of emerging technologies on information system software/hardware.
- 3 2 1 0 11. Identify Structural capacities and Electrical wiring codes
- 3 2 1 0 12. Develop security plan.
- 3 2 1 0 13. Demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, and firewall).
- 3 2 1 0 14. Differentiate between point-to-point and point-to-multipoint network topologies.
- 3 2 1 0 15. Identify emerging networks.
- 3 2 1 0 16. Demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.
- 3 2 1 0 17. Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.)

and wireless systems.

- 3 2 1 0 18. Demonstrate knowledge of the TCP/IP protocol suite.
- 3 2 1 0 19. Identify standard high-speed networks (e.g., broadband, ISDN, SMDS, ATM, FDDI).
- 3 2 1 0 20. Install appropriate operating system hardware and software and peripherals.
- 3 2 1 0 21. Recognize environmental problems.
- 3 2 1 0 22. Demonstrate knowledge of the basic elements of network maintenance.
- 3 2 1 0 23. Fix recoverable problems.

10108 Network Security

Network Security is a technical level course in the Network Systems pathway. The course provides students with the opportunity to gain additional expertise in Networking Security. Unlike with other computer programming courses, the emphasis is on how to structure and document computer programs, using problem-solving techniques. As students advance, they learn to capitalize on the features and strengths of the language being used.

- 3 2 1 0 1. Identify security requirements
- 3 2 1 0 2. Analyze existing procedures.
- 3 2 1 0 3. Define business objectives to be achieved by the application.
- 3 2 1 0 4. Identify site and system constraints.
- 3 2 1 0 5. Develop security plan.
- 3 2 1 0 6. Identify security requirements and the need for data protection.
- 3 2 1 0 7. Identify specific access levels that need to be accommodated.
- 3 2 1 0 8. Match security system design to identified security requirements.
- 3 2 1 0 9. Demonstrate knowledge of the role that routers, firewalls, intrusion detection systems, and VPNs play in security.
- 3 2 1 0 10. Demonstrate knowledge security requirements and the need for data protection.
- 3 2 1 0 11. Demonstrate the knowledge of access levels that need to be accommodated
- 3 2 1 0 12. Implement security plan.
- 3 2 1 0 13. Evaluate installation requirements.
- 3 2 1 0 14. Install information system application programs in accordance with requirements.
- 3 2 1 0 15. Recognize security problems.
- 3 2 1 0 16. Develop a disaster recovery plan.
- 3 2 1 0 17. Formulate a support plan
- 3 2 1 0 18. Identify resources and risks.
- 3 2 1 0 19. Identify support requirements.

10254 IT Essentials: PC Hardware & Software

*IT Essentials: PC Hardware and Software course introduces students to the fundamentals of computer hardware and software, mobile devices, security and networking concepts, and the responsibilities of an IT professional. The latest release includes mobile devices, Linux, and client side virtualization, as well as expanded information about Microsoft Windows operating systems, security, networking, and troubleshooting. By the end of the course, students will be able to: * Describe the internal components of a computer and assemble a computer system. * Install and understand operating systems on computers and mobile devices. * Connect to the Internet and share resources in a networked environment. * Troubleshoot using system tools and diagnostic software.*

- 3 2 1 0 1. Identify how the four components of a network operating system (i.e., server platform, network services software, network redirection software,

- 3 2 1 0 2. Select a LAN/WAN technology that meets defined set of requirements.
- 3 2 1 0 3. Demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.
- 3 2 1 0 4. Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems.
- 3 2 1 0 5. Demonstrate knowledge of the open system interconnection (OSI) standard (ISO Standard 7498).
- 3 2 1 0 6. Demonstrate knowledge about the difference between stand-alone, peer-to-peer and client-server networks and software.
- 3 2 1 0 7. Demonstrate knowledge of network operating systems (i.e., Windows XP, LINUX, UNIX, etc.).
- 3 2 1 0 8. Demonstrate knowledge of the general characteristics of network operating systems.
- 3 2 1 0 9. Add capability to a software system by recording macros and storing them in the system's library.
- 3 2 1 0 10. Assemble necessary components to complement information system design.
- 3 2 1 0 11. Configure software appropriately for system and user application.
- 3 2 1 0 12. Convert data between different software packages and between software and the OS version.
- 3 2 1 0 13. Customize a general-purpose software package (e.g., DBMS) to provide specific functionality beyond the default setting.
- 3 2 1 0 14. Import/Export data between different software packages.
- 3 2 1 0 15. Install LAN Management software.
- 3 2 1 0 16. Load software with minimum disruption of process flow.
- 3 2 1 0 17. Resolve compatibility issues.
- 3 2 1 0 18. Demonstrate knowledge of hard drive setup and troubleshooting.
- 3 2 1 0 19. Demonstrate knowledge of hard drive technologies (IDE, EIDE, SATA, SCSI, etc.).
- 3 2 1 0 20. Configure hardware system.
- 3 2 1 0 21. Demonstrate knowledge of how hardware components interact and how conflicts arise.
- 3 2 1 0 22. Employ appropriate safety precautions when working with PC.
- 3 2 1 0 23. Install mainboard (with memory/CPU).
- 3 2 1 0 24. Restore system and configuration.
- 3 2 1 0 25. Demonstrate hard drive maintenance procedures (defrag/scan (2) clear caches, etc.).
- 3 2 1 0 26. Differentiate between hardware and software failure.
- 3 2 1 0 27. Identify problems in the operating system and related hardware.
- 3 2 1 0 28. Update flash memory (BIOS).
- 3 2 1 0 29. Demonstrate knowledge of how to turn LANs into MANs and WANs.
- 3 2 1 0 30. Differentiate between LANs, MANs and WANs.
- 3 2 1 0 31. Identify the basic broadcast topologies (e.g., star ring, bus).
- 3 2 1 0 32. Identify the basic point-to-point network topologies (e.g., star, ring, tree, network irregular).
- 3 2 1 0 33. Interpret basic networking terminology.

APPLICATION LEVEL COURSES

31095 Applied Concepts of Networking Systems

Students acquire Personalized Learning representing explicit objectives measured against specific target employment skills that are not available in other courses. The personalization of learning will be based on a particular work environment, workplace experience and/or the

essential skills addressed from previous coursework. Goals: Provide student with an opportunity to work outside of the school at a business (Internship, Job Shadowing, Work Study Programs) that applies to the knowledge they gained in the Technical Level. (Example, Network securities, Administrator, technician)

- 3 2 1 0 1. Apply past knowledge acquired from Technical Level Courses.
- 3 2 1 0 2. Deliver Results: Supporting the business in dealing with network, server and general IT issues
- 3 2 1 0 3. Know the Business: Strong functional and technical knowledge to deliver solutions where required
- 3 2 1 0 4. Commercial understanding and judgement: Clearly understands the job function and how the function underpins the business from a commercial position.
- 3 2 1 0 5. Keeping our promises and commitments: Demonstrates a 'can do' approach to problem solving and can offer innovative solutions.
- 3 2 1 0 6. Individual responsibility and personal development: Seeks opportunities to develop own skills and knowledge in order to maximize benefits from changing technology.
- 3 2 1 0 7. Maximizing team working and communicating openly: Develop an internal customer service relationship
- 3 2 1 0 8. Working with Tools and Technology: Selecting, using, and maintaining tools and technology to facilitate work activity.
- 3 2 1 0 9. Develop a report and present information about workplace experience.

31099 Network Systems Project Management and Resource Scheduling

Course gives students who are not able to find an internship or cooperative work environment the ability to apply what they learned from the Technical level course. The course will be administered by a teacher in the school with the goal of providing a project base curriculum for the student to solve real world problems. (Example Analyze existing and planned business environments and develop a strategy for the implementation of a network infrastructure that addresses the business needs.) Ways to implement would having student enter Business Professional of America: Network Design Team competition or Cisco Networking Academy NetRiders. Instructor will be able to create a curriculum based on the requirements of the competition.

Network Systems Specific Competencies

- 3 2 1 0 1. Apply technical skills in the network design
- 3 2 1 0 2. Evaluate and delegate responsibilities needed to perform required tasks
- 3 2 1 0 3. Utilize problem solving techniques
- 3 2 1 0 4. Demonstrate teamwork skills needed to function in a business setting
- 3 2 1 0 5. Analyze existing and planned network and systems management
- 3 2 1 0 6. Demonstrate knowledge of network cable topologies
- 3 2 1 0 7. Diagram a completed network
- 3 2 1 0 8. Analyze end-user work needs
- 3 2 1 0 9. Plan for placement and management of resources
- 3 2 1 0 10. Plan for decentralized resources or centralized resources
- 3 2 1 0 11. Incorporate redundancy into the network
- 3 2 1 0 12. Design a remote access solution
- 3 2 1 0 13. Analyze network infrastructure, protocols, and hosts
- 3 2 1 0 14. Estimate upgrade cost based on existing environment
- 3 2 1 0 15. Incorporate future expansion into the network
- 3 2 1 0 16. Demonstrate an ability to meet software requirements
- 3 2 1 0 17. Identify the company's tolerance for risk
- 3 2 1 0 18. Analyze technical support structure
- 3 2 1 0 19. Design a routing strategy
- 3 2 1 0 20. Develop multiple recommendations to scenarios

3 2 1 0 21. Produce business reports

Project Management Competencies

1. Recognize different resource types (Work, Material, Cost, Budget, Personnel/Skills, Generic, etc)
2. Understand the concept of scope and demonstrate in context of assessing the size of a project.
3. Develop plans for project management and resource scheduling.
4. Identify key personnel and responsibilities for project.
5. Develop SWOT analysis [Strengths, Weaknesses, Opportunities, and Threats] for project.
6. Analyze workload of tasks and projects.
7. Determine required personnel groups and management hierarchy.
8. Determine resources necessary for project completion.
9. Determine essential tasks necessary for project completion.
10. Design potential timelines for assignments.
11. Explore appropriate technologies for project management and resource scheduling.
12. Create and present a project management and resource scheduling plan.
13. Create Gantt charts.
14. Evaluate and assign resources to tasks.
15. Implement project management skills to design and complete a collaborative project.
16. Learn various survey strategies to track project progress.
17. Develop strategies for monitoring interconnected assignments.
18. Survey strategies for critical path scheduling.
19. Create strategies to manage project budgets.
20. Build survey analysis for customer satisfaction